Twentieth Century Laboratory Collections in the University of Turin

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The Scientific and Technological Archives of University of Torino were established in 1992 and two years ago celebrated twenty years of activity in collecting, preserving and appraising the material heritage of the sciences that were taught in the six centuries of life of our University, founded in 1404. The special circumstance was celebrated with a symposium dealing with the study, conservation and museology of scientific instruments, with the participation of Paolo Brenni. On the same day a new and large space for the permanent exhibition was inaugurated as an extension of our Archives, located in the old buildings of the former Tobacco Factory whose foundation dates back to 1758. This large room is near the smaller one (Fig. 1) mostly dedicated to older relics and was entitled "Laboratory of the Twentieth Century", representing the concrete result of the work of active preservation of the scientific patrimony of the last century (Fig. 2), which is too often neglected and wasted. One of the reasons for this spoliation is that the aesthetic aspect of the instruments made after WW1 became less and less appealing if compared to the bright and golden colour of the shining brass that was the main characteristic of older devices. Moreover such unappealing and anonymous tools at the end of their active life were considered only as awkward stuff to be discarded in order to retrieve room for new needs. Scientific institutions and museums usually do not pay enough attention to the need to witness the steps of an accelerating evolution that was producing a rapid change in the shape of the laboratories. A significant example of such a lack of awareness was the irresponsible loss, at the end of the seventies, of a Siemens electron microscope UM 100 which had been in use in our University since 1939.

When the Scientific and Technologic Archives were founded in 1992 a research campaign for the identification of unattended relics of the past was carried out in all the institutes and departments of our University. This caused the salvage of many instruments from the nineteenth century, mostly dating back to the second half of the century, the important period when Torino became the capital of the 'positivist movement' in Italy, which had a great influence mostly in the biological and medical fields.

In the statute of our University there is a commitment for each department to inform the University's Archives of all their obsolete instruments and so we received many proposals regarding the preservation of instruments of the twentieth century, most of them of the last decades. We could understand that not many artifacts of the time between the two World Wars survived because of many reasons: we must remember that in Italy in the thirties there was also the nation-wide recycling of metals caused by the restrictions applied by the League of Nations against the fascist regime. Other important causes of loss of the modern scientific instruments were often their size, shape and colour: indeed they became more efficient but less beautiful so there were fewer propensities to preservation and collection. Despite this relative scarcity of relics from the last century, nevertheless our Archives decided to pay great attention to this period in which so much scientific progress and evolution took place.

Fig. 1 *The first exhibition hall with a variety of instruments.*

Fig. 2 *A view of the main storage room.*

Fig. 3 *The photogrammetry island with Wild RC5 aerial camera and Officine Galileo Digital Stereo Cartograph in the background.*

Fig. 4 *The optical microscopy area with several instruments, not only microscopes but also microtomes and other ancillary tools.*

The new large exhibition hall that was inaugurated in October 2012 is dedicated to the science of the twentieth century. It is divided in isles and each one exhibit instruments of a single scientific discipline or shows the evolution of a scientific technology. Each area is planned as a reconstruction of a real laboratory and so it is possible to explain the actual work of researchers in the different fields. The first deals with photogrammetry (Fig. 3) and contains a Wild RC5 camera for 18x18 cm pictures, which was operated for many years from a two-engined Partenavia P68 airplane. There also are two large photogrammetric stereoplotting instruments made by Officine Galileo in Florence: the older is a Stereosimplex model, dates back to the fifties and is fully opto-mechanical but capable, with many fine regulations, to directly draw a topographic table with level contour lines from a couple of picture taken from an airplane. This evolved into the Digital Stereo Cartograph by the same firm. This instrument had an interface to a computer, so reducing the complexity of the mechanical structure. Finally a Zeiss Orthocomp Z allows a fully digital elaboration of orthophoto images with geometrical correction and scale unification but, despite its efficiency, it was scrapped because it needed a wide sheet of photographic film to draw the maps and such film material is no longer produced. A simple stereo binocular permits to the visitors the actual experience of seeing three-dimensional images of the ground and explains the principles applied in the complex instruments of this group.

The next isle is dedicated to the optical microscope (Fig. 4) in its various manifestations, but here it is possible to explain also many techniques that are needed for the preparation of specimens of differing nature, suitable for different observation methods. A classic laboratory of histology shows thermostats and various types of microtomes, a cryostat, knife sharpeners and a rotating saw for hard tissues or mineral thin slices sectioning.

A group of Italian microscopes by Officine Galileo, Florence, and Koristka, Milan, is an interesting demonstration of an excellent industry that, in spite of its real value, was unable to stand the international competition in the sixties. The other instruments are by Leitz, Zeiss, Reichert, Wild, Nikon and are biological, polarizing, metallographic, inverted, projecting, comparators, stereomicroscopes, some with camera lucida and photographic cameras.

Dentistry has contributed to our exhibition with a surgery from the thirties (Fig. 5) equipped with a pedal-driven drill, and a complete studio from the sixties, both of them endowed with x-ray sets, the older is a Ritter D5 and the other is a Siemens R330, and a dental technician workshop. A rather appealing item is the dummy on which dentistry students learn their job before approaching a human being.

Electron microscopes (Fig. 6) are shown in the next isle and the older is a Siemens Elmiskop II, then there are a Jeol Superscope and a Siemens Elmiskope 101; all of them transmission electron microscopes. The scanning e.m. is a Siemens ETEC Autoscan fitted with a wave length dispersion x-ray spectroscope.

According to our didactic approach, we exhibit also the instruments needed for the preparation of samples and so there are ultra-microtomes, Reichert OM U2 and a less common Leitz Fernandez-Moran, a LKB knife-maker 7800 and a Pyramitome 11800, an Edwards high vacuum coating unit 12 E6, a Leybold freeze-fracture, a critical point dryer and a Technics Hummer II metal sputter coater.

Scientific cinematography has a special place in our exhibition hall and in the scientific history of Torino University because when, in the first decade of the twentieth century, this town became the Italian

Fig. 5 *Dentistry set-up of the 1930s in the foreground with in the background equipment from the sixties.*

Fig. 6 *Isle with electron microscopes.*

Fig. 7 *The scientific cinematography isle: in the centre a Du Mont mod. 321 oscilloscope cine-camera, in the background a Zeiss-Winkel cine-microscope, an editing table and a Peterson film strip printer.*

Fig. 8 *The reconstruction of a chemistry lab with a hanging centrifuge, a wooden chemical hood and various instruments and glassware.*

Fig. 9 *Heart surgery operating room dating back to the late fifties with a heart and lung Pemco Pump model 5000 for extracorporeal circulation.*

capital of silent movie, some scholars took advantage of the availability of technical equipment to record moving images related to their researches. For instance the psychiatrist Camillo Negro filmed the behavior of unsound minds and some years later the anatomist Giuseppe Levi used time-lapse cinematography through the microscope in order to study the growth and movements of neurons in in-vitro cultures. Indeed this isle shows a small lab for cell cultures with glass jars, thermostat, autoclave, and inverted microscope. The specific instruments are a Zeiss-Winkel cinemicroscope, followed by an editing table, a Peterson film strip printer, a Du Mont mod. 321 oscilloscope cine-camera and a small projection hall with 35 and 16 mm projectors (Fig. 7).

Chemistry cannot be ignored because of the large number of glass hardware, reagents and the wide range of analytical instruments that we collected from many departments. The isle now shows the reconstruction of a laboratory (Fig. 8) with classic tools like gas-producing Kipp apparatus, densitometer, colorimeter, spectrograph, polarimeter, diffractometer and a hanging centrifuge. Old wooden laboratory furniture with a chemical hood recreates the atmosphere of a laboratory from the first half of the last century. The further evolution of chemistry instruments, with the application of photometrical cells and electronic tubes amplification, is demonstrated by a F. & M. Lautenschläger pHmeter and a Unicam Sp 600 spectrophotometer.

As medicine and, mostly, surgery can be represented by a wide amount of instruments and devices, we needed to find a strong image and an appealing story as a symbol. So we decided to reconstruct the operating room used by Achille Mario Dogliotti (Fig. 9) who was a pioneer in open heart surgery in the fifties, performing the first ever heart and lung extracorporeal circulation: a Pemco Heart Pump mod. 5000 is the most specific instrument and stands together a gas anesthetic machine, an electric scalpel, a cryo scalpel and a defibrillator.

Merceology is a scientific discipline diffused in Latin countries, dealing with the systematic study of commodities and, as an obvious consequence, collections were organized for didactic purposes of all kinds of minerals, woods, chemicals, metals, leathers, ceramics etc. The merceology museum (Fig. 10) was part of the Business and Economics School in our University and the collections were gathered from the end of the nineteenth century to about half of the twentieth century. It was closed when the School moved to new facilities and now it

Fig. 11 *The first Italian laboratory (1917) for psycho-physiological selection of airplane pilots during WW1 is fully restored and reconstructed.*

is going to be fully reconstructed and reordered in our Archives as a historical relic.

The last thematic area is a rather peculiar one as it shows the laboratory of psyco-physiological selection of airplane pilots during WW1 (Fig. 11), organized by Amedeo Herlitzka who became one of the founders of aviation medicine. A large amount of big and largely unknown instruments was found in 1994 during the rescue carried out in the cellars and other disused rooms in the Human Physiology Institute. We recognized a couple of hypothetical flight simulators as they displayed the cockpit of old airplanes such as Bleriot and Caproni in which a man could seat and was passively moved in the space, while he could move the controls as well as on a flying plane. The movement of the device and the reactions of the pilot were recorded by electric means on a kymograph. Other devices were used for the measure of reaction times with a Kipp chronograph which allowed the precision of one thousandth of second. Also the tolerance to fast atmospheric pressure decrease, that can be experienced by pilots at high altitudes, could be evaluated with an hypobaric chamber made on the original model of Paul Bert. This was a 'second life' for this instrument that had been realized more than twenty years before by Angelo Mosso, who was professor of physiology before Herlitzka, for his original researches about the problems of life on the high mountains, as it was the period in which mountaineering began with the first climbs on the Alps. Mosso had a particular skill in inventing new instruments for his work and we can show also the ergograph and the ponometer, both used for evaluating the muscle fatigue, but the second one allowed to separately consider the nervous component of strain. A final and rather fascinating item is the "Mosso's balance" that was made to investigate the distribution of blood towards the brain during emotional and intellectual activity.

The main activity of our Archives in the last twenty years was to organize temporary exhibitions and, until now, the science of the nineteenth century was mostly the protagonist in various fields, but recently also more recent instruments have been exhibited and the positive reactions of people has shown that there is a growing interest in modern artifacts and also that their appearance is more and more appreciated. We are sure that in the near future our permanent display will receive growing interest and the events we will plan will often deal with contemporary science.

Fig. 10 *The Merceology Museum from the Business and Economics School, with an exhibition of all kinds of minerals, woods, chemicals, metals, leathers, ceramics etc.*

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